January 2004

Japan: Environmental Issue

Introduction

In the past few decades (and especially since the late 1980s), Japan has significantly improved energy conservation and environmental protection. Since that time, Japan has become a world leader in the development and implementation of pollution control technologies and energy efficiency innovations. It is now one of the preeminent international disseminators of environmental technology.

The environmentally friendly nature of current Japanese polices represents a significant departure from earlier periods, when the government pursued economic development without regard to environmental impact. This nearly exclusive focus on economic development led to significant public health problems like "minamata" disease, which was caused by industrial emissions released in waste water. While Japan's environmental protection efforts have improved, it still faces a number of environmental challenges. In particular, increased energy consumption as a result of economic growth has led to increases in nuclear waste, road traffic, pollution and other energy-related environmental problems. These have offset some of Japan's environmental progress.

The roles of the different Japanese authorities involved in environmental protection are set out in the Basic Environment Law, which was enacted and implemented in November 1993. The Ministry of the Environment (MOE) is the chief national authority for environmental matters. It is responsible for coordinating policies and budgets, as well as setting various environmental standards. Many other offices in Japan's national executive branch also are prominently involved in environmental protection. Ministries engaged in drafting and enforcing national environmental policy include: METI; the Ministry of Health, Labor, and Welfare; and the Ministry of Agriculture, Forestry, and Fisheries. The Ministry of Public Management, Home Affairs, Posts, and Telecommunications is responsible for the Environmental Dispute Co-Ordination Commission, which was created in 1972 to mediate disputes over pollution. In addition to Japan's central government, prefectural and municipal authorities also play a role in environmental regulation. Sometimes, their regulations are even stricter than those set by the central government. Interestingly, the Basic Environment Law specifically allocates partial responsibility for global issues like ozone depletion and global warming to local authorities.

Air Pollution

Controlling air pollution is a major issue on both the local and national levels in Japan. It was first addressed in the Air Pollution Control Law of 1968, which was amended most recently in 1996. The Air Pollution Control Law provides for air quality monitoring stations in several parts of the country. These check whether nitrogen dioxide (NO_2), suspended particulate matter (SPM), sulfur dioxide (SO_2), carbon monoxide (CO) and photochemical oxidants (Ox) adhere to national emissions standards.

Emissions standards were established by order of the Prime Minister’s Office and were last amended in 1998. The limits on sulfur oxide emissions from stationary sources vary according to

the geographic location of the facility and height of the exhaust stack, and nitrogen oxide emission limit values vary according to boiler or furnace type. Sulfur content limits for fuels were included under the Air Pollution Control Law by amendments in 1995 and have been in force since 1996.

Automobile traffic is a major cause of urban air pollution in Japan. Vehicle emissions standards for nitrogen oxides, carbon monoxide, and hydrocarbons were also established by the Air Pollution Control Law and by the Automobile NOx Law of 1992. The latter only affects a total of 196 city, ward, town and village governments in Tokyo, Saitama, Chiba, Kanagawa, Hyogo and Osaka. The Automobile NOx Law was updated in 2002 to specifically focus on the emissions of diesel-powered vehicles. The Air Pollution Control Law and Automobile NOx Law also contain provisions aimed at reducing traffic congestion. In recent years, however, the share of private cars as a proportion of total passenger transport in Japan has increased, leading to more cars on already-congested roads. Japanese automakers are now producing trucks and vans in order to comply with "short term" emissions regulations implemented in October 2003 that require them to produce cars with very sharply reduced CO and hydrocarbons emissions. These regulations will become even more stringent in 2005.

While Japan's regulations have succeeded in dramatically reducing the concentration of sulfur dioxide over the past few decades, the MOE acknowledges that nitrogen dioxide concentrations have not declined. This reflects the continued growth in automobile use. Japan is expected to begin regulating volatile organic compounds in 2004. At present, Japan has the greatest concentration of VOCs amongst advanced industrial nations (4.9 tons a year per square kilometer). A CO2 emissions-trading program that was tested in December 2003 by METI is also expected to begin in early 2004.

Water Pollution

Japan's aquatic environment has improved significantly over the last few decades, as industrial water pollution was sharply curtailed. That said, the MOE acknowledges that its environmental quality standards for organic water pollution are still not being met in about 30% of Japan's total water area. Particular areas of concern are rivers running through urban areas and enclosed water areas such as inland seas, inlets, lakes, and reservoirs.

In addition to domestically-created water pollution, Japan is also impacted by international factors. For example, oil tanker traffic through the Sea of Japan has recently become an environmental problem. Due to the fact that several countries bordering the Sea of Japan have relatively weak environmental regulations regarding oil tankers, there have been large numbers of minor oil spills in recent years. The volume of oil tanker traffic along this route has caused coastal and marine pollution in Japan. In an effort to prompt better environmental behavior, the Japanese Ministry of Land, Infrastructure, and Transport proposed in March 2003 to increase the punitive fines for tanker spills by 50% pending the approval of the Parliament. If approved, the proposal would mean the largest tankers could face a $41 million increase in their fines. Besides tanker spills, the Sea of Japan is also negatively impacted by land-based pollution from neighboring countries. For example, up to 80% of the Russian city of Vladiostok's sewage is dumped into the Sea without treatment.

Energy Use and Carbon Emissions

In 2001, Japan was the 4th largest energy consumer in the world behind the United States, China and Russia. In that year, Japanese energy consumption amounted to 21.9 quadrillion Btu (more than all of Central and South America combined), or 5.4% of the world total (Japan's population is 2.1% of the world's total). Fossil fuels accounted for a significant majority of this energy consumption: 50.2% came from oil; 16.8% came from coal; and 13.6% came from natural gas. Nuclear energy was by far the most prominent non-carbon energy source; it contributed 14.4% of Japan's total

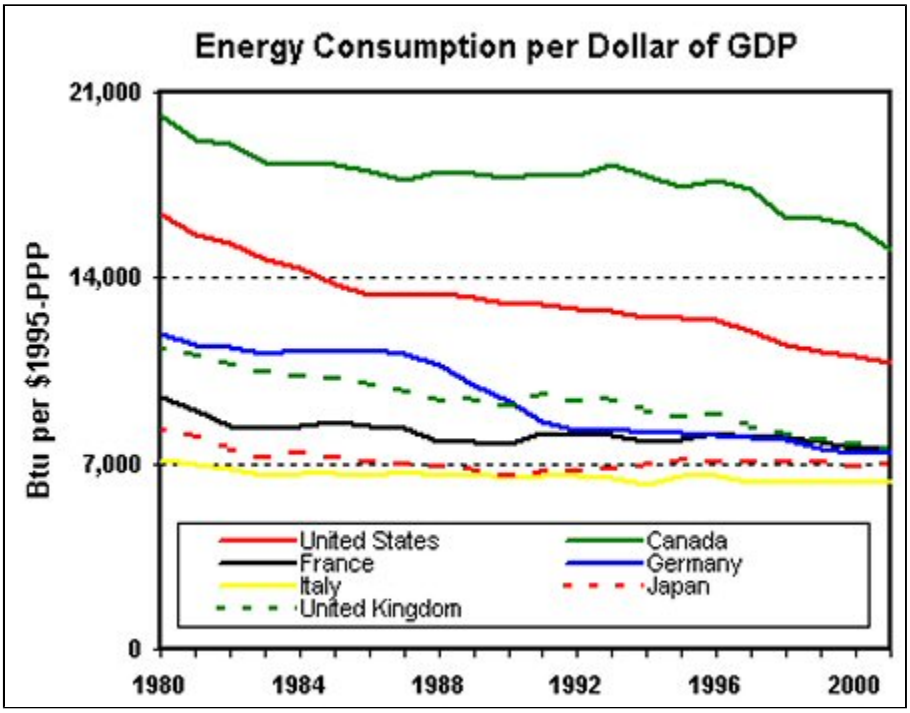
energy consumption. Although Japan is a world leader in renewable energy technologies, non-hydroelectric renewables accounted for only 1% of total energy consumption in 2001%. Japan's share of total world carbon emissions was somewhat smaller. In 2001, it accounted for 4.8% of the world's total energy-related carbon emissions.

Japan has been a strong supporter of efforts to combat global warming and played host to the conference that led to the Kyoto Protocol to the United Nations Framework Convention on Climate Change, which was finalized in December 1997. Japan ratified the Kyoto Protocol in June 2002. If it is ratified by at least 55 nations, accounting for at least 55% of 1990 carbon dioxide emissions from industrialized countries, Japan would have to reduce its emissions 6% from its 1990 levels between 2008 and 2012. In order to reduce emissions, the Government Advisory Committee for Natural Resources and Energy has proposed stepping up energy conservation efforts in all sectors, expanding renewable power generation, and gradually switching from coal to natural gas. As part of its commitment to the Kyoto Protocol, the MOE is considering a tax on carbon emissions, which has become known as the "environment tax." Though it has not yet passed, some Japanese firms have begun buying carbon emissions credits even though there is no market for their exchange yet.

Despite these proposals and strong public support for the ideals set out in the Kyoto Protocol, Japanese energy-related carbon emissions increased every year between 1999 and 2001. Overall, between 1990 and 2001, carbon emissions grew 17%, from 269 million metric tons to 316 million metric tons. This means that to achieve the levels required under the Kyoto Protocol, Japan would have to reduce its carbon emissions by 20% from their 2001 level. Recent events suggest that Japan is growing even more carbon intensive. According to the Japan Business Federation, carbon dioxide emissions by Japan's 35 main industries, including steel and car-manufacturing, increased 1.8% in fiscal 2002 from the previous year. Much of this rise may be attributable to increased operation of thermal electricity plants to compensate for the closure of nuclear reactors. Tokyo Electric Power (TEPCO) closed all its facilities following a scandal over its cover-up of safety problems.

Energy and Carbon Intensity

For a variety of economic, political, and cultural reasons, Japan is one of the least energy- and carbon-intensive countries in the developed world. In part, this is due to the fact that Japanese energy costs are among the highest in the world. This has led the country's heavy industry, formerly a major energy consumer, to streamline its energy use. In addition, Japan has continued to shift away from energy-intensive industries and has developed extensive energy efficiency programs.

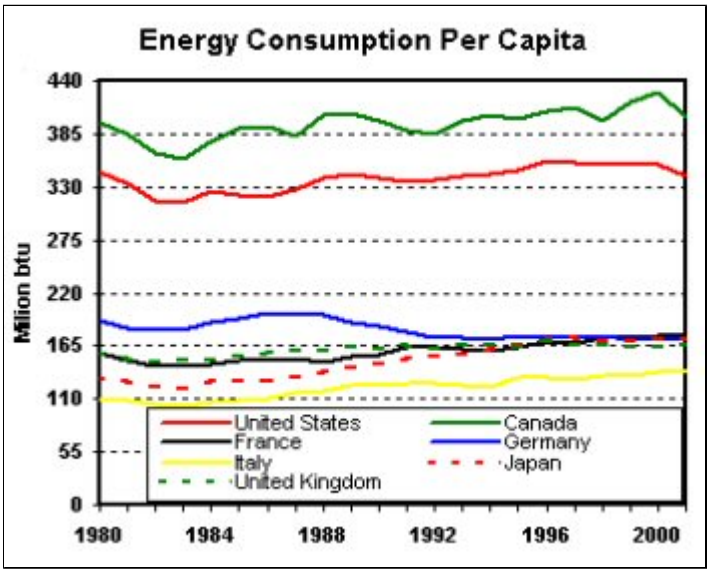


In 2001, Japan consumed 7,013 Btu per $1995-PPP, the second lowest behind Italy among the

Group of Seven (G-7) industrialized countries. Japan's carbon intensity is similarly low. In 2001, the country released 0.1 metric tons of carbon per thousand $1995-PPP, compared to the U.S. level of 0.17 metric tons.*

Japan has an Energy Conservation Law that sets energy efficiency standards on a broad range of products including everything from automobiles to home and office appliances. The law establishes a "Top Runner Program" that sets targets and timelines for energy saving improvements. Japan's Advisory Committee for Natural Resources and Energy plans to draw up a long-term plan for energy conservation in early 2004. This blueprint is expected to focus on curbing consumption in the private and transportation sectors.

Another aspect of the government's effort to reduce carbon emissions is to increase the exploitation of domestic resources. Japan has around 1.4 trillion cubic feet of proven natural gas reserves, with more possibly beneath the Sea of Japan. At present, Japan imports 97% of its natural gas, all in the form of liquefied natural gas (LNG).



Per Capita Energy Consumption and Carbon Emissions

While total Japanese energy consumption ranks fourth in the world, Japanese per capita energy consumption is lower than most other advanced nations. Japan consumed just 172.2 million Btu per person in 2001, around half of the United States' rate of 341.8 million Btu per person .This low consumption rate is primarily due to the rapid adoption of energy efficient technologies and government-mandated energy savings initiatives.

As with energy consumption, Japan's 2001 per capita carbon emissions were less than half the U.S. level. Japan emitted 2.5 metric tons of carbon per person, compared to 5.5 metric tons per person for the United States. Relative to other G-7 countries, Japan was in the middle. Per capita carbon emissions for Canada, Germany, and the United Kingdom were higher at 5.0, 2.7, and 2.6 metric tons per person, respectively. Italy (2.1 metric tons) and France (1.8 metric tons) had lower per capita carbon emissions rates.

Nuclear Energy

Japan would like to be able to increase nuclear energy consumption both to improve its energy security, and to reduce its carbon emissions. Japan's current 10-year energy plan, approved in March 2002, calls for the expansion of nuclear generation by about 30% by 2010. This is expected to entail the construction of between 9 and 12 new nuclear power plants. The Japanese government also plans to offer subsidies for nuclear power plant construction in order to offset expected cost-cutting pressures on utilities due to deregulation which might lead to increased reliance on fossil fuels for electricity generation.

Safety concerns have seriously jeopardized any expansion of the nuclear sector. Popular opposition has grown in recent years due to the serious accident at the Tokaimura uranium processing plant in September 1999 and the 2002 discovery that maintenance inspection findings at some nuclear reactors owned by TEPCO had not been properly reported to government regulators. The latter led

to the closure of all 17 TEPCO nuclear facilities. As of mid-January 2004, only 5 of the reactors had come back on-line. The reduction in nuclear power generation has led to reliance on thermal power plants. The unpopularity of nuclear power has led to the postponement of several new reactor projects, including some proposed by other utilities.

Japan's desire to reprocess the excess plutonium generated in its reactors has also provoked widespread public opposition. As an alternative to costly plutonium disposal methods and storage facilities, the country plans to build facilities that reprocess spent nuclear fuel and use the plutonium as fuel for fast breeder reactors. The mixed plutonium and uranium oxide (MOX) fuel program is seen as the sole option for consuming this plutonium, but it is feared that processing MOX reduces safety margins and increases the risks of more severe accidents. These fears were given new currency by the 1999 discovery that British Nuclear Fuels (BNFL) falsified data on MOX for use in a Fukui prefecture nuclear facility.

Renewable Energy

In 2001, Japan released a Revised Long-Term Energy Supply and Demand Outlook. It emphasizes efficient use of energy and the development of nuclear power plants as effective means of reducing CO2 emissions. The Outlook complements the Revised Energy Savings Law, adopted in 1999, which calls on central and local governments to offer effective economic incentives to promote wider use on environmentally friendly products and technologies, including solar cells and lower-emission and multi-fuel vehicles. The Revised Energy Savings Law established a "Top Runner Program" that sets targets and timelines for energy saving improvements. It also calls for dramatic increases in the use of renewable energy sources by 2010. Solar energy's installed capacity is expected to reach 5,000 megawatt (MW) by 2010, while the targets for wind power and geothermal energy are 300 MW and 1,000 MW, respectively. As a volcanic island country, Japan has significant potential for geothermal electricity generation. However, potential sites are difficult to develop, because almost all are located in National Parks.

Japan has recently initiated several policies aimed at promoting renewable energy. For example, the Green Power Fund was established in 2000 to promote the use of wind power. Renewable energy, especially wind power, also benefited from two important pieces of legislation in 2003 . The first was a revision of the Electricity Utility Law, which allowed new providers to the sell to a broader array of clients. It is intended to allow independent providers with comparatively little capacity to enter the electricity retailing business. The other recent legal change was the enforcement of the Special Measures Law Concerning Promotion of the Use of New Energy by Electricity Utilities, which introduced a renewables portfolio standard (RPS) system. The RPS system mandates that a certain percentage of power must come from renewable sources and is intended to force major power providers to generate or purchase renewable energy.

Outlook

Over the past few decades, Japan has made substantial progress in the development of environmental technology. It has also improved in the monitoring and control of pollution and carbon emissions. Japan is now emphasizing environmentally sustainable development technologies in its foreign aid programs, especially to other Asian nations whose own pollution directly or indirectly impacts Japan. Domestically, the Japanese government is trying to reduce energy consumption while at the same time encourage the use of renewable, nonpolluting energy sources. Japan also is attempting to curb energy consumption through economic incentives that affect both energy demand and supply. This has been rendered considerably more difficult by popular opposition to nuclear energy. Even if the nuclear sector's expansion is not curtailed, carbon emissions and local air pollution are likely to remain significant environmental challenges for Japan well into the future.

The U.S. Energy Information Administration, in its *International Energy Outlook 2003 (IEO)*, estimates that Japan's natural gas consumption (in the form of LNG) will increase approximately 1% per year until 2025, while oil consumption grows by only 0.8% annually. Although the *IEO* expects nuclear energy use to increase, it also acknowledges the possibility that popular opposition could derail the expansion.

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* GDP figures are based on OECD figures using purchasing power parity (PPP) exchange rates.

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